# RAMP CONSTRUCTION FOR 1- OR 2-FAMILY DWELLINGS

A ramp is an inclined walkway. The design and construction requirements for ramps used for access to one- or two-family dwellings are regulated by the **NC Residential Code**. People often cite the design requirements of two prominent federal "access codes," the Americans with Disabilities Act (ADA, 1990), and the Fair Housing Amendments Act (1988). Neither the ADA nor the Fair Housing Act Access Guidelines apply to single family remodeling. In fact, a ramp built onto a house in accordance with ADA or Fair Housing Guidelines would be much larger than necessary or would have restrictive handrail configurations. The requirements for compliance with the NC Residential Code are minimal and not as exhaustive as the NC Building Code standards for commercial buildings where public access requirements are based on ADA and Fair Housing Act Access guidelines. Although ramps for one- or two-family dwellings are not required to be designed to ADA requirements, the design of any ramp should be approached in terms of its intended use. The solution most appropriate for a particular household should be used instead of a configuration intended for generic public situations. **In the context of single family dwellings, national accessibility codes and standards should be restricted to the role of providing good general guidance information but not compliance requirements**. A ramp should be constructed with the dimensions, slope, and strength to safely provide the service requirements.

People in wheelchairs need access to elevated areas and may require the use of a ramp to enter their home. People using walkers, crutches, or other devices may also require the use of a ramp entry to their home. There are many factors involved in ramp design, and it may not be feasible for one specific design to accommodate the needs of every individual. The designer should consider the specific needs of the individual for which the ramp is being constructed, but all ramps have some common design elements:

**Ramp Location:**
Generally, ramps follow a path of travel frequently used by all household members, such as from the front door to the driveway or sidewalk. In some situations, none of the home's exits provide a workable ramping option. In these cases it may be necessary to create a new exit. One possibility to consider is converting an existing window into a new doorway. To incorporate a run of stairs off the top landing of the ramp is a good design feature to include, enabling other household members and visitors to enter/exit directly instead of having to use the ramp way. The visual impact of a ramp may be a factor to consider. Straight ramp runs, particularly those that project directly into a front yard or are extremely long, may look unattractive, while those sited close to, or wrapped around a house have a more pleasant appearance. Locating the ramp to take advantage of southern exposure so the sun can help dry the surface or melt snow is another factor to keep in mind. There may also be locations near trees or bushes that should be avoided for the leaves or pods they drop. Slope and rise requirements for the ramp, and the location of the "accessible" doorway, are the two most important factors in selecting the ramp location.

In addition, the zoning set back requirements need to be taken into consideration. Set back is the distance from the lot line beyond which construction cannot take place. For the set back requirements depend on the zoning classification for the property. For set back requirements contact the City of Asheville Planning and Development Department at 259-5830.

**Slope and Rise**:
Choosing the location for a ramp depends on the available yard area and the lay of the land. The slope of the ramp should be as small as possible. The NC Residential Code limits the slope to no steeper than 1:8. For wheelchair use, the slope should not be greater than 1:12 (every inch of rise will require one foot of run). Example: A rise that is 12" high would require a ramp that is12-feet long. The maximum rise for any one section of ramp should not exceed 30". Example: If a rise of 40" was necessary, then a total run of 40-feet would be needed. There should be an intermediate level landing constructed so that there is no section of sloping ramp that exceed 30-feet in length. Once you determine the slope, you can figure out how much length you need to devise a layout. A switchback, U- or L-shape is very common. You should allow space for a level landing at each change in direction.

**Door Opening**:
Just as important as the slope of the ramp is the width of the entry door. Most front doors are 36" doors (required by NC Residential Code). The doorway should have at least 30" clear opening with the door opened 90º, for a standard 27-in.-wide wheelchair. The ADA specifies 32" minimum clearance in door openings. The wheelchair user should have "elbow" room at the knob side of the door. For this purpose, the porch or landing should have 18" of level surface beyond the door's handle side, especially for a person using mobility equipment. This permits a person to move off to the side while opening the door without having to back up to get out of the way of its swing. If the door does not swing out over the landing then this is less of a problem. Thresholds on the entry door should not be more than ½" high above the landing or porch. A custom made beveled wood sill or pre-made "mini" aluminum ramp may be necessary to negotiate the doorway threshold.

**Design Load Criteria:**
Live load is the non-permanent load to which a structure is subjected in addition to its own dead weight. Among other things, live load includes the weight of persons and movable service equipment such as a wheelchair. The NC Residential Code requires that decks and ramps be designed using the assumption that the live load on the deck or ramp is only 40 pounds per square foot. If the ramp and deck landings are provided for wheelchair access, a minimum live load of 100 pounds per square foot should be used. This difference affects the allowable span for decking, floor joists, and beams, and the size of the footings.

**Materials:**
Concrete is the ideal material to use for ramp construction when the rise and run are minimal. For longer runs, wood seems to be the preferred material. The majority of ramps built at homes are of the "post-and-beam" construction type. The NC Residential Code requires that wood decks and ramps be constructed of pressure treated wood, or wood that is a naturally durable species (redwood, cedar). Fasteners, such as joist hangers, used in contact with pressure treated wood shall be approved for the type of wood. Bolts, nuts, washers, and screws need be hot dipped galvanized. Footings may either be cast-in-place concrete or precast solid concrete cap blocks. The NC Residential Code requires the bottom of footings to be located below the frost line, at least 12" below finished grade (18" is recommended based on local conditions). **Footings are required to be inspected by the Building Inspector after the holes have been dug, but before the poured concrete or solid concrete cap blocks are placed**.

**Clear Width**:
The NC Residential Code requires a minimum width of 36" for ramps (width of walking surface, not the clear distance measured between handrails). For wheelchair accessibility, the clear width of a ramp should be at least 36", measured between the handrails.

**Landings:**
Level landings are required at the top and bottom of each run of ramp. The NC Residential Code requires landings to be at least 3-feet by 3-feet. For wheelchair accessibility, level landings should be 5-feet long and as wide as the ramp. For a switch back turn for a 180º change in direction, the landing should be 5-feet by 8-foot minimum. Landings are basically small decks. Appendix "M" in the NC Residential Code provides a prescriptive design for residential decks based on 40 pounds per square foot of live load. A printed handout for residential deck design is available from the Asheville Building Safety Department and Permitting Center. The design for landings used as part of wheelchair access should be "beefed up" to be able to support at least 100 pounds per square foot of live load.

**Guardrails:**
Guardrails are what keep you from falling off something; handrails are what you hold on to in order steady yourself. The NC Residential Code requires guardrails only when the edge of a deck or ramp is more than 30" above the adjacent ground level. Required guardrails must be at least 36" tall and be constructed with intermediate pickets or rails. Typically 2x2 vertical pickets are part of the railing. The horizontal clear distance between the pickets shall not be greater than 4 inches. Even if a ramp is less than 30" off the ground, guardrails should be provided, if for no other reason, to serve as a place to mount handrails and edge protection.

**Handrails**:
The NC Residential Code requires a handrail only if the slope of the ramp is greater than 1:12. A ramp for wheelchair access should have handrails on both sides. A handrail must have a shape and size that permits gripping or grasping with the hand. A serviceable handrail can be fabricated out of 1-1/4" or 1-1/2" interior diameter standard steel pipe. Wood handrails not greater than 2-5/8" in cross-sectional dimension may also be used, but wood is not as durable or strong as steel pipe. In either case, the handrail needs to be mounted with brackets to allow at least 1-1/2" clearance between the handrail and the guardrail framing. This is necessary to allow the user's hand to close around the handrail. A handrail should be mounted between 34" and 38" above the ramp surface. A handrail on a ramp should have a level projection extending 12" beyond the slope surface at the bottom and top of the ramp, but the extension should not project into another path of travel so as to create a hazard. Handrails are required to be returned to the guardrail, to the floor or ground, or to a post, typically with a 90º return. The purpose of the return is so that the end of the guardrail does not present a hazard for catching clothing or limbs.

**Edge Protection:**
The NC Residential Code does not address edge protection for ramps. However, any ramps or landings for wheelchair access which have a drop off should have edge protection to prevent people and wheelchairs from slipping off. This can be accomplished by curbs or railings. Typically this is accomplished using the lower rail of the guardrail. The bottom of the lower rail should be not more

than 2" above the deck or landing surface, but with some clearance to allow for drainage of water or snow.

**Slip Resistance**:
Slippery surfaces can be a real problem, especially for the elderly. A broom finish perpendicular to the direction of travel on a concrete ramp is ideal. Wood decking can be very slippery. Possible solutions include sand grit strips and additives to paint. One suggestion is 36" wide, asphalt, rolled roofing nailed down to the wood decking. When the rolled roofing looses its grip, it can easily be replaced.

**Transition from Ramp to Sidewalk:**
Remove enough dirt to allow the ramp framing to maintain the proper slope for a smooth transition to ground level. Any pressure treated lumber in direct contact with the ground should be rated for "ground contact". An alternative design is to construct a poured concrete ramp section for the first 6 inches of rise or 6 feet of run. Concrete slabs shall not be less than 3-1/2" thick at any point, so you still have to dig out where the ramp meets a sidewalk so the top of the ramp meets at the top of the sidewalk. The wood framed portion of the ramp would butt against the sloped concrete ramp section. Any level ground surfaces that are part of a wheelchair access route should be concrete or asphalt.

**Building Permit Application:**
Construction of a ramp or deck requires a Building Permit and a Zoning Permit. Permit applications are obtained at the Development and Permitting Center of the Asheville Building Safety Department. Three copies of complete construction drawings are to be submitted with the permit application. Construction drawings should include complete framing layout, slope information, type of materials used, guardrail and handrail detail, and footing sizes. In addition, a site plan is required, showing the property boundaries of the site, the location of the proposed ramp addition and the existing building(s) on the site, plus the distances from the new construction to the property lines.

## Development and Permitting Center

**Mailing Address:**
City of Asheville
PO Box 7148
Asheville, NC 28802

**Location:**
Public Works Building
161 South Charlotte Street
Room A-101
Asheville, NC 28801

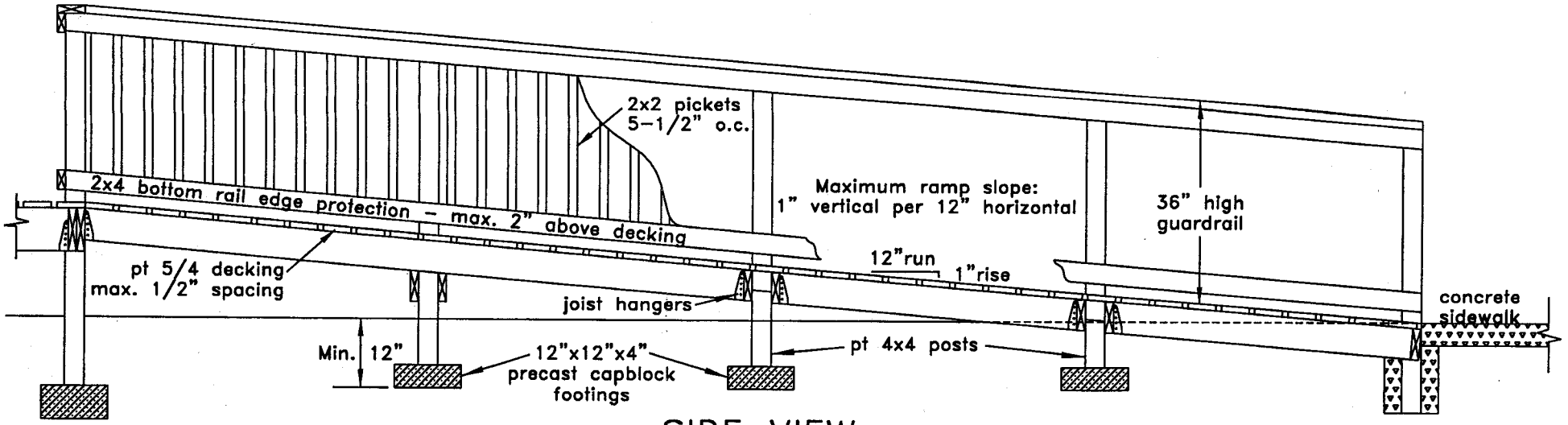
**Phone Number:** (828) 259-5846
**Fax Number:** (828) 259-5676
**Office Hours:** 8:00 am - 4:30 p.m.

**Additional Resources for Ramp Design**:

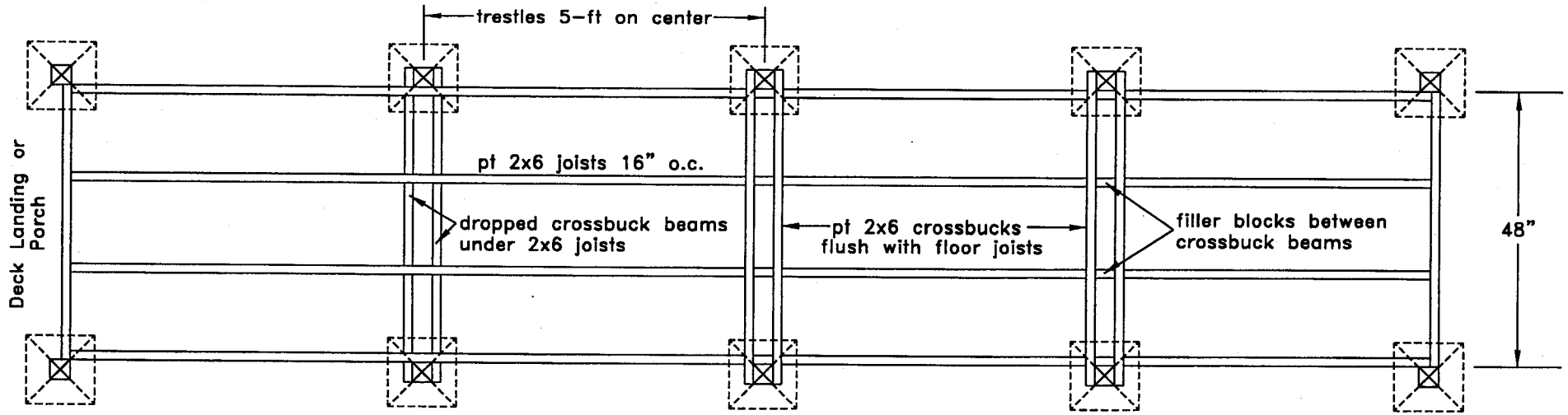
The Center for Universal Design, NC State University
www.design.ncsu.edu:8120/cud/pubs/wood_ramp.htm

Adaptive Access (Houston, Texas)
www.adaptiveaccess.com/handicap_ramps.php

The Home Ramp Project. Metropolitan Center for Independent Living, Inc.
www.wheelchairramp.org/rampman/manual/rampcov.htm




## SIDE VIEW




## PLAN VIEW

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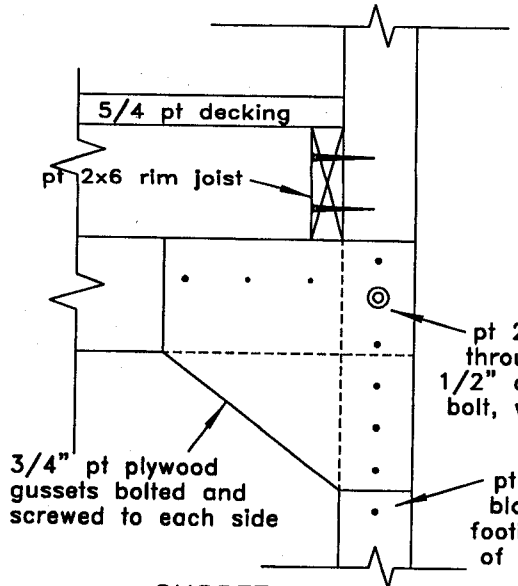
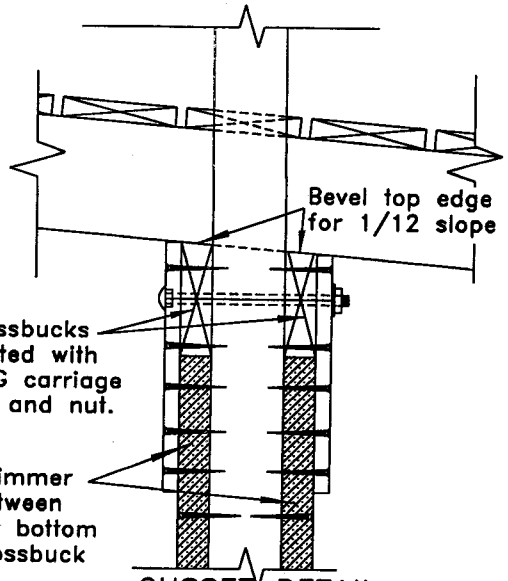
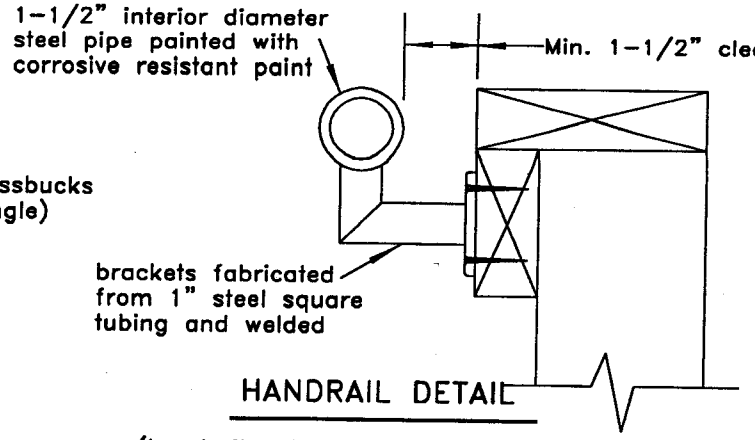
|---|---|---|---|
| Sheet Number: R-2<br>Date: 2/06/04 | Design Criteria:<br>100 psf live load<br>RAMP<br>PLAN | Drawn By:<br>Ed Stoll<br><br>ASHEVILLE<br>BUILDING SAFETY<br>DEPARTMENT | **RAMP FRAMING DESIGN**<br>Single Family Dwelling Construction Only<br>(not for commercial applications) |




GUSSET DETAIL
FRONT VIEW

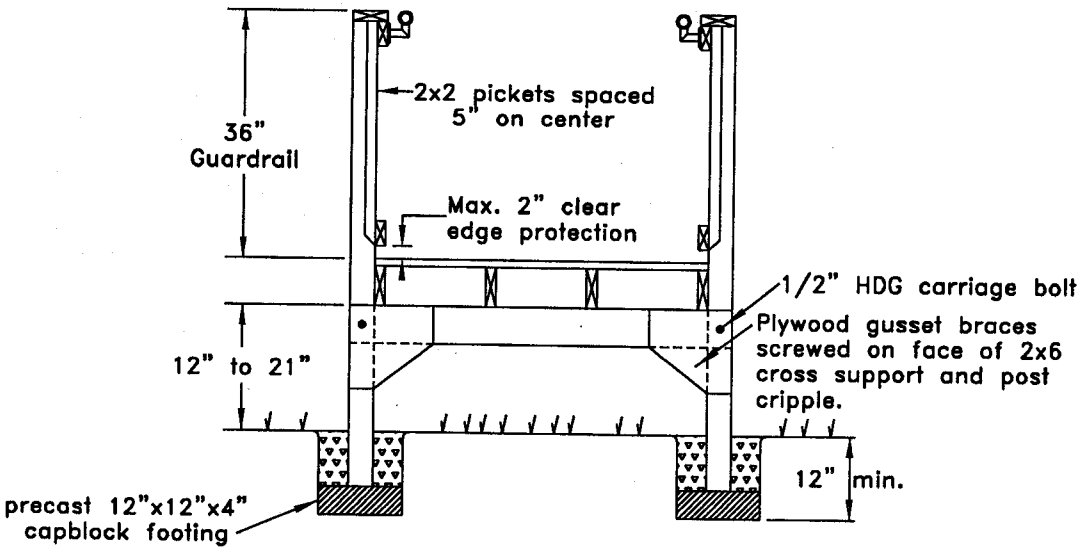



GUSSET DETAIL
SIDE VIEW

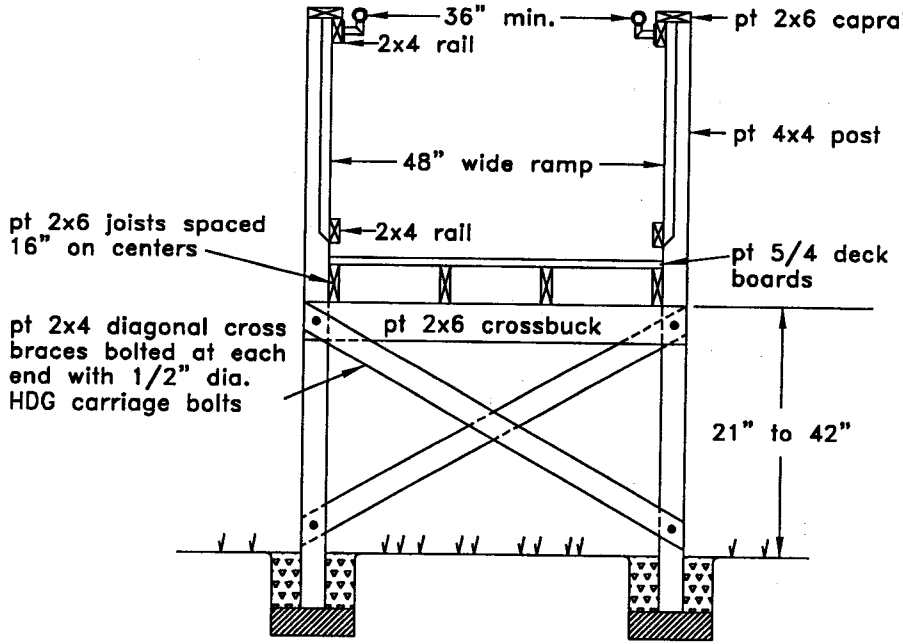



HANDRAIL DETAIL

(handrail optional but recommended)




SHORT TRESTLE (12" TO 21")




TALL TRESTLE (21" TO 42")

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|---|---|---|---|
| Sheet Number: R-1<br>Date: 2/06/04 | Design Criteria: 100 psf live load<br>RAMP PLAN | Drawn By: Ed Stoll<br>ASHEVILLE BUILDING SAFETY DEPARTMENT | RAMP TRESTLE DESIGN<br>Single Family Dwelling Construction Only<br>(not for commercial applications) |